To: Ms. Donna Searcy
Secretary of the
Federal Communications Commission
1919 M Street, NW
Washington, D.C. 20054

Date: July 30, 1992

From: Kent Britain
Engineering Manager LTV Missiles Group
Mail Stop MSF-61
P.O. Box 650003
Dallas, Texas 75265-0003

Subject: Reply comments of the Missile Group Old Crows regarding the Petition for Rulemaking of North American Teletrac and Location Technology, Inc. RM No. 8013

Background: Engineering Manager at the LTV Missiles Group

Professor of Electronics at Tarrant County Junior College (Two nights a week)

Member of The Association of Old Crows (Professional Society of fellows in the Electronic Warfare Industry)

Chairman of the VHF/UHF Council (Amateur Radio Council representing 800 weak signal enthusiast)

Vice-President of the North Texas Microwave Society (304 Members with approximately 75 902-928 MHz Users)

By using cross polarization and some minor frequency shifts, the amateur radio community has co-habitated the 902-928 MHz band with PacTel Teletrac in the North Texas area for one year.

Most of our members use high gain antenna arrays, and many have frequency agility throughout the 902-928 MHz band. As such, the Arlington, Texas engineering staff of PacTel Teletrac has called upon our members on several occasions to locate sources of interference.

In short, we have been good neighbors.

I, and many, of my fellow amateurs are professionally engaged in the design and use of Military Spread Spectrum systems. Many of PacTel's problems are similar to those encountered in early military systems 20 and 30 years ago.

Many of the concerns mentioned in the comments in this matter probably could be solved without exclusivity and with a better technical approach. After observing the operation of Teletrac system, the following observations are offered concerning what appear to be shortcomings in its design.

Design Defect #1: Wide VCO Bandwidth

PacTel appears to be detecting their Quadri Phase signal by simply Phase Locking a VCO to 3632 MHz. The 3632 MHz signal is derived by multiplying the incoming 908 MHz signal 4 times.

Solution: Tightening the Bandwidth lowers the chance that a CW carrier will lock the VCO to the wrong frequency and would reduce jitter caused by nearby signals.

Design Defect #2: Detection using a simple DC Coupled Low Pass Filter

This is perhaps the simplest Spread Spectrum demodulation system, but, it allows a CW signal within the receiver pass band to integrate as a DC voltage.

This voltage rises and rises until the receiver AGC is blocked.

This detection scheme also has 0 dB Process Gain

Solution: "Integrate and Dump" is a preferred detection technique. Also Adaptive Suppression Circuits are a mature and commercially available technology.

But significant improvement can often be gained with a few .01 MFD coupling capacitors.

OTHER POINTS:

The PacTel Teletrac system only uses 3.2 MHz of the 8 MHz allocation. To guard their fragile receivers, they need as much guard frequency as could hold 1600 Analog Celluar Telephone Channels.

This very poor spectrum use impacts the Secondary and Part 15 users.

PacTel Teletrac and the public would be better served by upgrading or fixing their cell site receivers as soon as possible.

Properly designed Spread Spectrum Systems operate with dozens of CW carriers within the receiver passband.

The "Missile Group Old Crows" volunteer our services to review the PacTel Teletrac site receiver design.

CONCLUSIONS:

This is a prime example of an area where military technology spin-offs (Adaptive Suppression) can be applied to commercial systems.

As a taxpayer, I am very disappointed that PacTel Teletrac has chosen to solve their technical problems with lawyers and government intervention instead of a few .01 MFD capacitors.

Kent Britain

Kent Britain
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cc: Missile Group Old Crows (Distribution)
VHF/UHF Council (Distribution)
Teletrac
Amtech
Pinpoint
Southwestern Bell